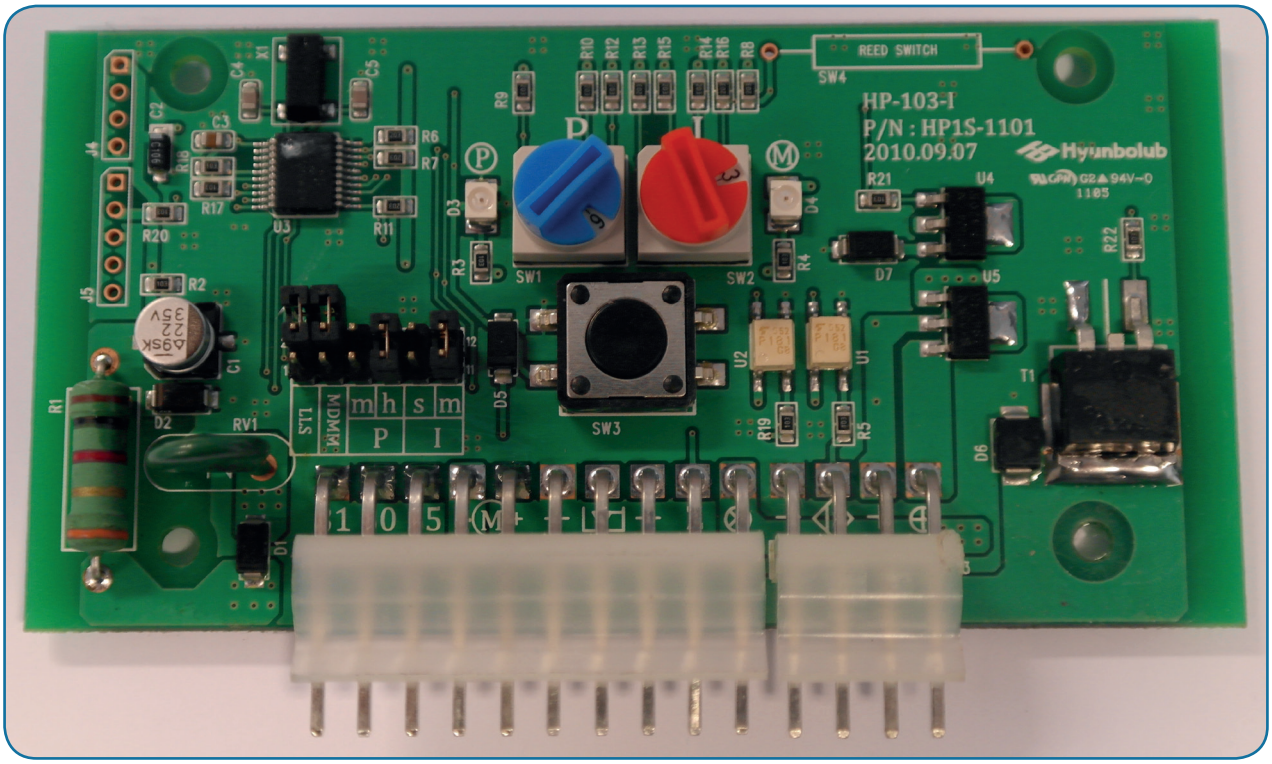
Internal Timer Control Manual - Grease Pump

- **HP-103-I for HP-103 Pump**
- **HP-103-I-B for HP-M127 Pump**



Caution! : Functions marked with an **X**, are not available for the HP-103-I-B pump.

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1. Preface to the User Manual

1.1 General

The operation instructions contain important information for safe and right operation of internal grease pump controller, HP-103-I or HP-103-I-B. It is recommended that a user must read the instructions carefully prior to operation as we can't take on any liability for damages and failures resulted from non-observance of the instructions.

These instructions must be completed to include the respective national regulations concerning to accident prevention and environment protection.

1.2 Users Responsibility

To ensure the safe operation of the pump, the user is responsible for the following:

- The pump shall be operated only for the intended use and its design shall neither be modified nor transformed.

- The pump shall be operated properly only if it is in a proper functioning condition and if it is operated in accordance with the maintenance requirements.

- The operating personnel must be familiar with this operation manual and the safety instructions mentioned herein and observe these carefully.

- Wastes (e.g. used oil, detergents, lubricant) must be disposed in accordance with relevant environmental regulations.

2. Safety Instructions

2.1 General safety instructions

The safety instructions shall be observed when the pump is installed, operated and serviced.

- Custom : the personnel responsible for the handling of the system should wear protective gears and glasses for safety.
- Working environment : the pump must be free from inflammable materials. Working environment should be clean all the time.
- Maintenance : before repair or maintenance, power should be switched off.
- Cleaning : during the operation of the pump, cleaning should not be carried out. During cleaning, the personnel should wear mask, protective gears and shoes. To be protected from toxic gas, working environment should be well ventilated.

2.2 Exclusion of liability

- caused by lack of lubricant due to irregular refilling of the pump
- caused by the use of contaminated lubricants or insufficient lubricants
- caused by chemical or biological modifications of the lubricants used
- caused by inadequate disposal of used or contaminated lubricants as well as of components that have been in touch with lubricant
- caused by unauthorized modification of the system components
- caused by insufficient use of power voltage
- caused by the use of unapproved parts.

2.3 Symbol explanations

The following pictograms and signal words used in this manual give the seriousness of danger.

Warning: refers to faults or serious damages

Caution: refers to serious damages

Caution: refers to possible damages from misuse of electric devices

Note: refers to improvements in handling of systems

Caution: refers to possible fire and explosion

3. Product description

3.1 Summary

This controller is designed to operate automatic lubrication pump in accordance with the control sequence. The control sequence is repeated regularly with its operating and pause time. During set pause time, pump stops. And then during set operating or monitoring time, pump operates. At the operating time, grease is being distributed to each lubrication point through element of pump connected to a metering device. This cycle is repeated regularly.

Pump operation ways are determined according to below 2 types of mode. In addition, to monitor grease level of pump, Low level monitoring mode is equipped with.
In the General Mode (GM), a pump operates during set time (operating time) same as pause time. Therefore automatic lubrication cycle is regular in this mode.
Metering Device Monitoring Mode (MDMM) is used for indicating the fault status of automatic lubrication system to user such as leakage and blocking, through detecting the pulse signal from the piston detector mounted on metering device. Its automatic lubrication cycle is variable according to the configuration of system.

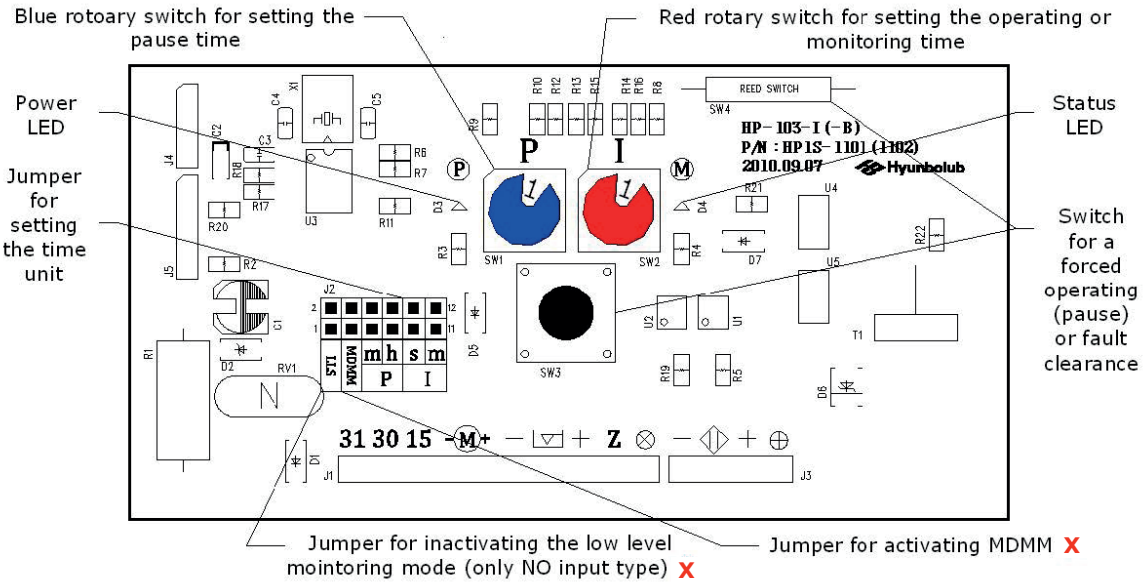
Users are allowed to monitor the status of lubrication system through LED equipped on the products and indicator connected with cable from the product. Available external equipments are as below;

- Low level sensor **X**
- Compulsion operation and Pause switch
- Piston detector for monitoring operation of metering device **X**

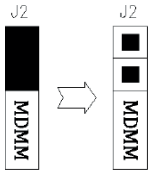
During the car is running, the operating time and pause time is memorized periodically.

3.2. Specification

Item		Specification	
POWER	Rated Voltage	12/24 VDC	Surge/Overvoltage & Inverse Voltage protection
	Operating Voltage	9 ~ 30 VDC	
	Consumption Current	Max. 25mA	Controller solo-specification
Control Output	Motor	NPN, NO 1 Point	Protection from overcurrent by external fuse (10A) of controller
	Lamp for indicating pump operation	NPN, NO 1 Point PNP, NO 1 Point	Protection from overcurrent with max. 250mA (at reset overcurrent,returns automatically)
Control Input	Compulsion operation and Pause switch	NPN, NO 1 Point	Detecting sensor at keeping more than 1.5 sec
	Low level sensor	NPN, NO or NC 1 Point	Detecting sensor at keeping more than 3 sec
	Piston detector for monitoring operation of metering device	NPN, pulse 1 Point	Detecting sensor when each status is being sustained more than 500ms
Timer	Pause time	4 ~ 60 min 1 ~ 15 hours	4min interval, 15 range 1hour interval, 15 range
	Operation/Monitoring time	8 ~ 120 sec 2 ~ 30 min	8sec interval, 15 amplitude 2min interval, 15 amplitude
Available pump model		Hyunbo: HP-103 (HP-103-I), HP-M127 (HP-103-I-B) Other company: P203 (HP-103-I), MLP (HP-103-I-B)	
Booting Time		6 sec	
EMC		HMC Standard: ES96202-01 Electrostatic Discharge: ES96200-00 (Ver G) X	

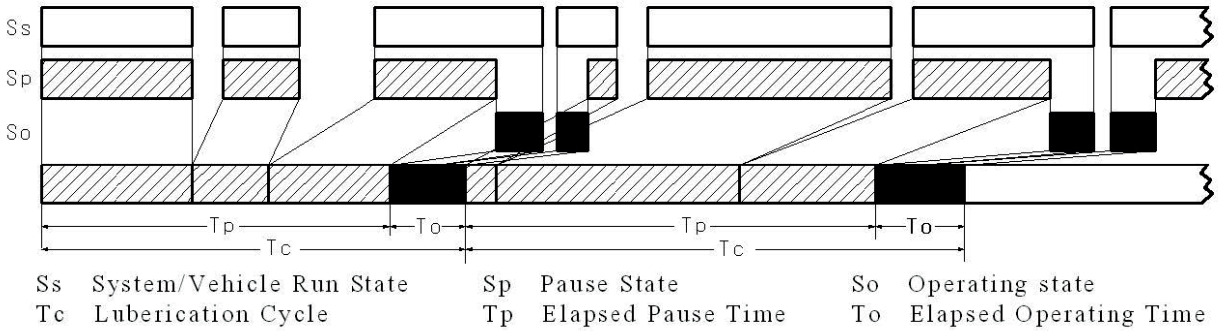

Blue rotoary switch for setting the pause time
Red rotary switch for setting the operating or monitoring time
Power LED
Jumper for setting the time unit
Status LED
Switch for a forced operating (pause) or fault clearance
Jumper for inactivating the low level mointoring mode (only NO input type) X
Jumper for activating MDMM X
REED SWITCH
HP-103-I(-B)
P/N : HP1S-1101(1102)
2010.09.07
Hyunbolub
31 30 15 -M+ Z

4. General Mode



In case of that the MDMM jumper of J2, control device is changed from Metering Device Monitoring Mode to General Mode.
When the pump is in pause or operation, the changed set value is applied from next operating time.

4.1 Operation timing table



4.2 Pause Time

- Pause time means the time that pump doesn't work and it determines the period of automatic lubrication. (Generally pause time is extremely longer than operation time)
- Set value can be changed by blue colored rotary switch.
- When the lubrication system is stopped or disconnected with power, elapsed time is memorized in EEPROM. And if the system continues or power is connected, it operates based on memorized time.
- If set value is changed on the pump pause or operating time, the changed set value is applied in next pause time.
- It is different depending on system configuration.

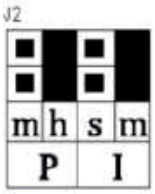
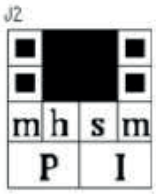
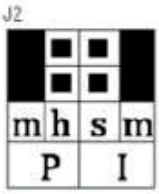
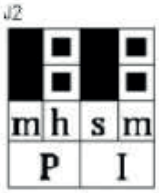
4.3 Operating Time

- It depends on the quantity of distributed grease in the lubrication system.
- Set value can be changed by using red colored rotary switch. When the lubrication system is stopped or disconnected with power, elapsed time is memorized in EEPROM. And if the system continues or power is connected, it operates based on memorized time.
- If set value is changed on the pump pause or operating time, the changed set value is applied in next pause time.
- It is different depending on system configuration.

4.4 Time set

- Time unit set

Time unit of operating time and pause time is set depending on the position of below jumper.

Jumper Position				
Time Unit of pause time	Hour	Hour	Minute	Minute
Time Unit of operating time	Minute	Second	Minute	Second

- Pause Time

It is available to change 15 set values depending on the position of the blue colored rotary switch.

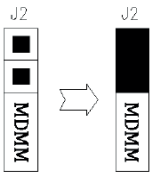
Position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Minute	Fault 'D'	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
Hour		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

- Operating Time

It is available to change 15 set values depending on the position of the red colored rotary switch.

Position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Second	Fault 'D'	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
Minute		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30

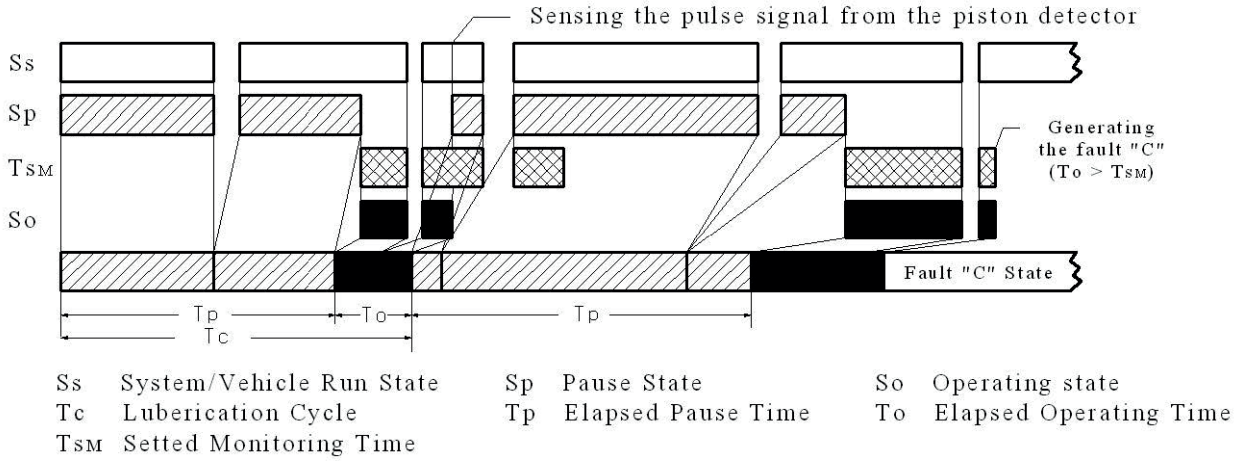
5. Meetapparaat modus X



In case of that the MDMM jumper of J2 attached left pictures is connected, control device is changed from General Mode to Metering Device Monitoring Mode. When the pump is in pause or operation, the changed set value is applied from next operating time.

The definition of the pulse signal of Metering Device Monitoring Sensor means that status shall be changed twice. To reduce an effect from noise, controller shall recognize that it is a change of status to sustain signal more than 500ms.

5.1 Werkrooster



Ss System/Vehicle Run State
Tc Lubrication Cycle
TSM Setted Monitoring Time
Sp Pause State
Tp Elapsed Pause Time
So Operating state
To Elapsed Operating Time

5.2 Pause Time

Same as General Mode

5.3 Operating Time

- In operating mode, pump is operating until pulse signal is input from sensor attached on one outlet to monitor Metering Device operation. It means time.
- When the pump is operating, metering device operates a piston of an outlet orderly and distributes grease into each lubrication point. If distributing grease into all outlet is completed one time, the equipped sensor on the one outlet instead of a piston generates pulse signal.
- While the metering device is operating, even though the system stops or power is disconnected, elapsed operating time is stored.
- It is different depending on system configuration.

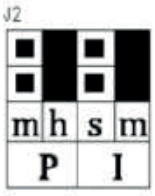
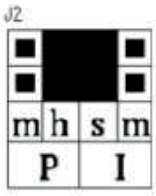
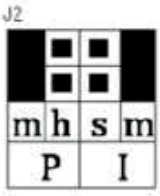
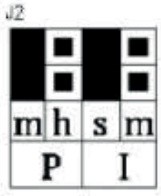
5.4 Monitoring Time

- Monitoring time for metering device operation (Fault “C”)
- Set value can be changed by using red colored rotary switch.
- When the lubrication system is stopped or disconnected with power, elapsed time is memorized in EEPROM. And if the system continues or power is connected, it operates based on memorized time.
- If set value is changed on the pump pause or operating time, the changed set value is applied in next pause time.
- It is different depending on system configuration.

5.5 Time Settings

- Unit Time Setting

The unit time of monitoring time and pause time is set depending on the position of below jumpers.

Jumper position				
Unit time of Pause time	Hour	Hour	Minute	Minute
Unit time of Monitoring time	Minute	Second	Minute	Second

- Pause Time

It is available to change 15 set values depending on the position of the blue colored rotary switch.

Position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Minute	Fault ‘D’	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
Hour		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

- Monitoring Time

It is available to change 15 set values depending on the position of the red colored rotary switch.

Position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Second	Fault ‘D’	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
Minute		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30

6. Laag niveau sensor

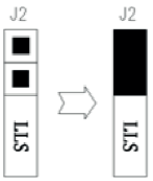
1. Available Low level sensor type is NPN and NO (Normal Open).
   If customized, NC (Normal Close) is available.
2. To make strong against noise, if low level signal is not kept more than 3 sec, it is not recognized.

6.1 NO input (Factory Settings)

In case of that LLS jumper of J2 is removed, controller detects “NO signal” from “LowLevel sensor” equipped in pump to indicate fault status “B” and lack of grease. In case of that the LLS jumper is connected, Low level signal is sent to controller instead of the sensor. Then It can be used for checking if the sensor is fault or not.

Low-level sensor-uitgang op de ingang naar de controle-unit contacten zal NO (normaal open) van het NPN type moeten zijn.

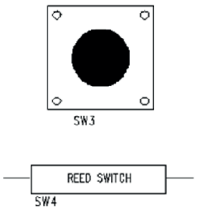
6.2 NG input (Customized)



In case of that LLS jumper of J2 is removed, controller immediately detects “NC signal” from “Low level sensor” equipped in pump to indicate fault status “B” and lack of grease.
In case of that the LLS jumper is connected, controller immediately stops to monitor grease level.

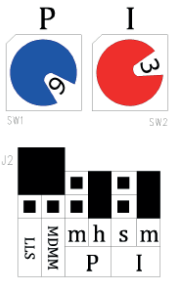
Low-level sensor output on the input to the control unit contacts should be NC (Normal Close) of NPN type.

7. Compulsion Operation Mode and Pause mode



If SW3 (Tact Switch) located on the center of controller is pushed more than 2 sec or SW4 (Reed Switch) located on the upper of controller is reached with magnet more than 2 sec, the status of pump is changed from operating to pause or from pause to operating compulsorily. At switching to operation mode, pump operates for set operation time.

8. Factory Settings



Operation Mode ..... General Mode
Low level Monitoring ..... NO, Disabled
Pause Time ..... 6 Hours (HP-103-I) / 4 Hours (HP-103-I-B)
Operation Time ... 6 Minutes (HP-103-I) / 16 Seconds (HP-103-I-B)

9. Fault Diagnosis and Trouble Shooting

9.1 Fault status

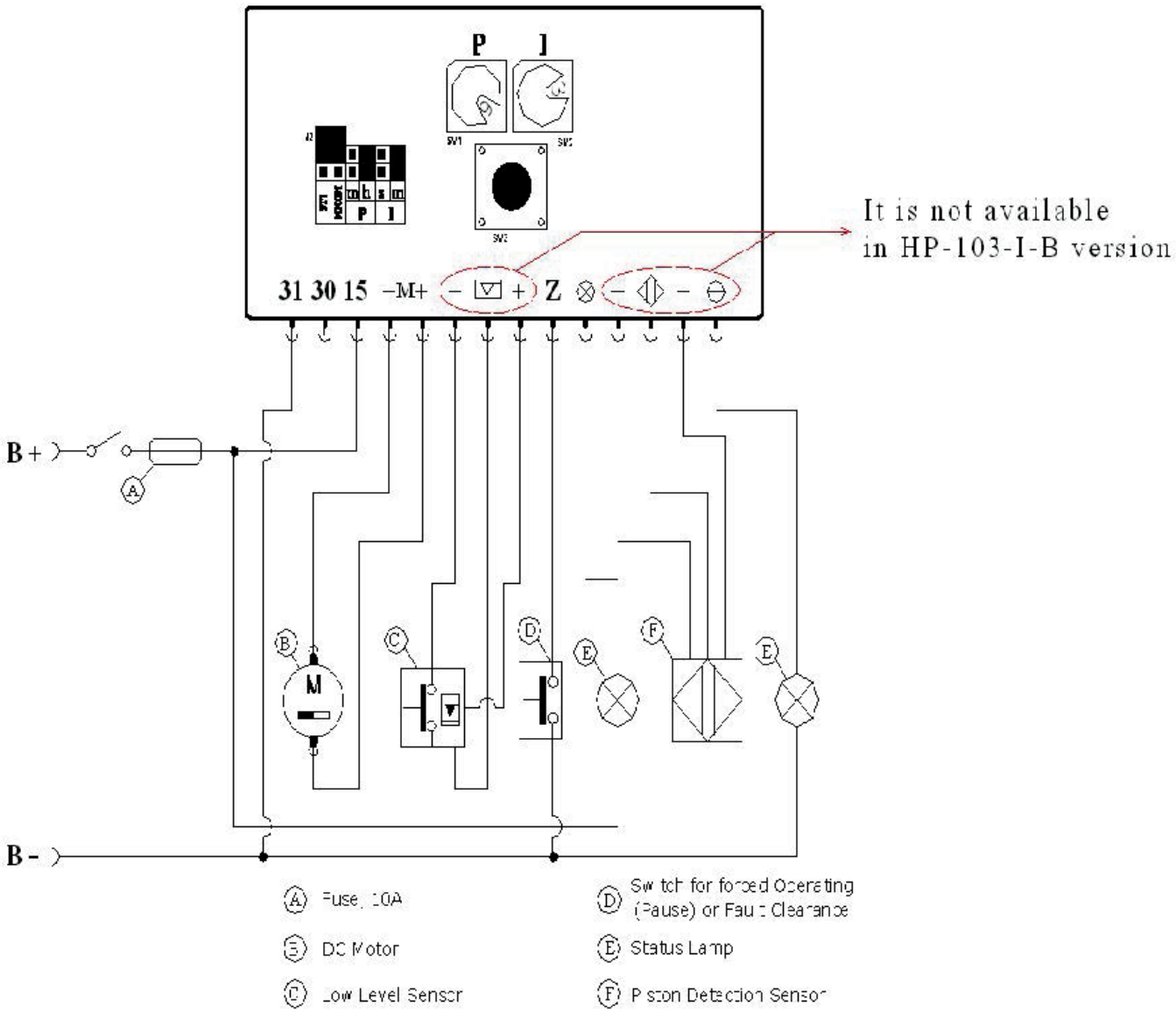
If fault occurs, pump stops to operate. And User can recognize fault status from LED which is equipped on the products and lamp connected externally. Following articles show how to know each fault according to blinking pattern.

Fault Classification	Blinking cycle (sec)	Fault status and cause
A	0,25	Error of EEPROM for storing status information of pump operation
B	0,5	Lack of grease in pump (Low Level) **X**
C	1	• During monitoring time, pulse signal is not detected from metering devic operation monitoring sensor. Lubrication point or metering device operation fault (Blocking due to some material, air) • Detection sensor fault • Sensor cable fault
D	2	Time set rotary switch set error (‘0’ position)

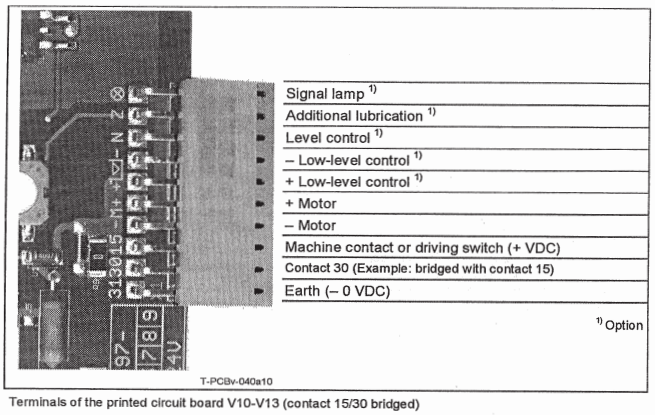
9.2 Fault Clearance

Method	Fault Classification	Fault status and cause
Automatic Clearing	B, D	In case of the cause of fault is removed.
Compulsory Clearing	A, B, C, D	In case of that power is reconnected after power is disconnected. ⚠ Possible to clear compulsory in case of ‘A’, but if fault occurs frequently, the product is needed to replace.
	B, C	• If button is equipped inside of product and compulsory operation switch connected externally are pushed for around 2 seconds, it is cleared compulsory.

10. Wiring Diagram



Terminals of the printed circuit board



Terminals of the printed circuit board V10-V13 (contact 15/30 bridged)